

Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

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Appendix Tables

Analyses including Snowbirds

Appendix Tables 1, 2 and 3 repeat the analysis presented in the body of the paper, with the addition of beneficiaries who had 10% or more of their claims during the two years prior to the move from providers located in regions outside their original region of residence (referred to as Snowbirds in the text).

Analyses stratifying for each of the 25 potential combinations of residential changes

Appendix Table 4, 5 and 6 repeat the analysis presented in the body of the paper, but display each of the 25 combinations of original intensity quintile of residence and post-move intensity quintile of residence.

Codes used for Chronic Conditions

Appendix Table 7 provides a list of the ICD-9-CM codes used to assign diagnoses to the major chronic conditions used in the paper.

Analyses stratifying by whether move was within or across Census Regions

Appendix Tables 8, 9 and 10 show changes in prevalence of recorded chronic conditions, imaging services and laboratory tests per person per year during the five years before and after a move stratified by whether the move was **within** one of the nine U.S. Census regions or **across** Census regions.

One year risk of death following a move, by whether move was up or down in intensity.

Appendix Table 11. Relative risk of death within one (Table 11a) and three (Table 11b) years of move, stratified by whether the beneficiary moved up or down in intensity.

Increase in prevalence of chronic conditions among movers and non-movers.

Appendix Table 12. Increase in the prevalence of specific chronic conditions among movers and non-movers.

Appendix Table 1. Baseline characteristics of the study population: Medicare beneficiaries, age 65 and over who remained in fee-for-service practice from 1999 to 2005 and changed and did not change their HRR of residence between 2001 and 2003, including beneficiaries who had 10% or more claims from outside their original region of residence during the two years prior to the move (i.e. including “snowbirds”).

	Demographics			Evaluative and Diagnostic Practices			Diagnosis Scores	
	Mean Age	% Female	% Black	MD Visits	Lab Tests	Imaging Services	Number of Diagnoses	HCC Score
Resident of Quintile One (lowest intensity)								
Did not change HRR of residence (N= 600,490)	75.5 75.5-75.5	59.4 59.3-59.5	1.5 1.5-1.6	9.7 9.7-9.7	7.3 7.3-7.4	2.9 2.9-2.9	0.51 0.51-0.51	0.95 0.94-0.95
Moved within Quintile One (N = 10,943)	76.1 75.9-76.2	63.8 62.9-64.7	0.5 0.4-0.7	10.9 10.7-11.2	7.8 7.6-8.0	3.2 3.1-3.3	0.60 0.58-0.61	1.02 1.01-1.04
Moved to higher intensity region (N = 12,310)	75.4 75.3-75.5	62.1 61.2-62.9	2.3 2.0-2.5	11.6 11.4-11.8	8.0 7.8-8.2	3.4 3.3-3.5	0.62 0.61-0.64	1.02 1.00-1.03
Resident of Quintile Two (Second lowest)								
Did not change HRR of residence (N= 583,865)	75.4 75.4-75.4	61.0 60.8-61.1	6.3 6.3-6.4	11.0 10.9-11.0	8.5 8.4-8.5	3.2 3.2-3.2	0.59 0.59-0.59	0.99 0.99-0.99
Moved to lower intensity region (N = 4,699)	76.3 76.1-76.5	66.1 64.7-67.4	1.7 1.4-2.1	12.7 12.4-13.1	8.6 8.3-8.9	3.6 3.5-3.8	0.69 0.66-0.71	1.08 1.06-1.11
Moved within Quintile 2 (N = 3,973)	76.1 75.9-76.3	66.4 65.0-67.9	4.4 3.7-5.0	12.8 12.4-13.2	8.6 8.3-9.0	3.7 3.6-3.9	0.70 0.67-0.73	1.11 1.08-1.13
Moved to higher intensity region (N =10,680)	75.7 75.6-75.8	65.6 64.7-66.5	5.7 5.2-6.1	13.0 12.7-13.2	9.2 9.0-9.4	3.8 3.7-3.9	0.71 0.69-0.73	1.08 1.06-1.09
Residents of Quintile 3 (middle intensity)								
Did not change HRR of residence (N = 593,265)	75.3 75.3-75.3	61.5 61.4-61.7	8.0 8.0-8.1	11.5 11.5-11.5	9.0 9.0-9.0	3.4 3.3-3.4	0.61 0.61-0.61	1.00 1.00-1.01
Moved to lower intensity region (N = 7,141)	75.8 75.6-75.9	65.0 63.9-66.2	4.6 4.1-5.1	12.9 12.6-13.2	9.0 8.8-9.3	3.7 3.6-3.8	0.69 0.67-0.72	1.08 1.06-1.10
Moved within Quintile 3 (N = 4,735)	75.8 75.6-76.0	66.2 64.9-67.6	5.2 4.5-5.8	13.5 13.1-13.9	9.6 9.3-9.9	4.0 3.9-4.1	0.75 0.72-0.78	1.12 1.10-1.15
Moved to higher intensity region (N = 8,086)	75.4 75.3-75.6	64.0 63.0-65.1	6.2 5.7-6.7	13.5 13.2-13.9	9.6 9.3-9.8	3.9 3.8-4.0	0.71 0.69-0.73	1.09 1.07-1.11
Residents of Quintile 4 (Second highest)								
Did not change HRR of residence (N = 624,235)	75.3 75.3-75.4	61.0 60.9-61.1	8.3 8.3-8.4	12.3 12.2-12.3	9.7 9.7-9.8	3.6 3.5-3.6	0.65 0.64-0.65	1.02 1.02-1.02
Moved to lower intensity region (N = 13,938)	75.9 75.8-76.0	64.3 63.5-65.1	4.2 3.9-4.5	13.9 13.7-14.1	10.1 9.9-10.3	4.0 3.9-4.1	0.74 0.72-0.75	1.11 1.09-1.12
Moved within Quintile 4 (N = 8,130)	75.6 75.5-75.8	62.9 61.8-63.9	3.6 3.2-4.0	14.1 13.8-14.5	10.3 10.1-10.6	4.1 4.0-4.2	0.73 0.71-0.75	1.10 1.08-1.12
Moved to higher intensity region (N = 4,484)	76.4 76.2-76.6	64.8 63.4-66.2	7.7 7.0-8.5	15.7 15.2-16.2	11.3 10.9-11.7	4.4 4.2-4.6	0.83 0.80-0.86	1.21 1.18-1.24
Residents of Quintile 5 (highest intensity)								
Did not change HRR of residence (N = 529,464)	75.9 75.9-75.9	62.0 61.8-62.1	9.3 9.2-9.3	14.8 14.8-14.9	12.7 12.6-12.7	3.8 3.8-3.8	0.76 0.76-0.77	1.11 1.11-1.11
Moved to lower intensity regions (N = 16,467)	76.2 76.1-76.3	64.2 63.4-64.9	6.7 6.4-7.1	15.7 15.4-15.9	11.8 11.6-12.0	4.2 4.1-4.3	0.83 0.81-0.84	1.17 1.16-1.19
Moved within Quintile 5 (N = 11,210)	76.5 76.4-76.7	65.9 65.0-66.8	7.3 6.8-7.7	18.0 17.6-18.3	14.4 14.1-14.7	4.6 4.5-4.7	0.94 0.92-0.96	1.27 1.25-1.29

Note: in each cell, upper number is the average or percentage of a measure and lower range is its 95% Confidence Interval. The data for movers are from the year before move and the data for non-movers are from 2002, corresponding to the year before move. Non-movers were 65 or older in 2001 and survived 5 years.

Appendix Table 2. Percent increase in number of major diagnoses, laboratory tests and imaging services among Medicare beneficiaries who changed and did not change their HRR of residence, stratified by the intensity of the Hospital Referral Region prior to and after moving, including beneficiaries who had 10% or more claims from outside their original region of residence during the two years prior to the move (i.e. including “snowbirds”).

Population	Change in diagnoses per person			Change in imaging services per person			Change in laboratory tests per person		
	%	SE	95% CI	%	SE	95% CI	%	SE	95% CI
Resident of Quintile One (lowest intensity)									
Did not change HRR of residence (N= 600,490)	65.6	0.35	64.9–66.3	43.9	0.34	43.2–44.5	31.6	0.26	31.1–32.1
Moved within Quintile One (N = 10,943)	60.5	2.47	55.7-65.3	22.0	2.08	17.9-26.0	23.3	1.93	19.4-27.0
Moved to higher intensity region (N = 12,310)	82.0	2.53	77.0-87.0	50.6	2.34	46.2-55.3	60.9	2.39	56.2-65.6
Resident of Quintile Two (Second lowest)									
Did not change HRR of residence (N= 583,865)	63.9	0.31	63.3–64.5	49.6	0.34	48.9–50.3	37.4	0.25	36.9–37.9
Moved to lower intensity region (N = 4,699)	58.2	3.44	51.5-64.9	23.1	3.08	17.0-29.0	16.2	2.81	10.8-21.8
Moved within Quintile 2 (N = 3,973)	69.8	4.03	61.9-77.7	30.1	3.37	23.4-36.6	36.3	3.60	29.0-43.2
Moved to higher intensity region (N =10,680)	75.9	2.38	71.3-80.6	44.6	2.23	40.1-48.9	55.9	2.20	51.7-60.3
Residents of Quintile 3 (middle intensity)									
Did not change HRR of residence (N = 593,265)	62.6	0.29	62.0–63.2	47.8	0.34	47.1–48.5	36.0	0.23	35.5–36.4
Moved to lower intensity region (N = 7,141)	56.9	2.71	51.5-62.2	25.7	2.36	21.0-30.3	27.3	2.19	22.9-31.5
Moved within Quintile 3 (N = 4,735)	61.9	3.37	55.3-68.5	29.4	3.04	23.5-35.5	33.7	2.91	27.9-39.3
Moved to higher intensity region (N = 8,086)	68.1	2.67	62.8-73.3	45.7	2.74	40.5-51.3	60.6	2.56	55.5-65.5
Residents of Quintile 4 (Second highest)									
Did not change HRR of residence (N = 624,235)	62.5	0.30	61.9–63.1	49.7	0.33	49.1–50.3	37.6	0.24	37.1–38.0
Moved to lower intensity region (N = 13,938)	56.2	1.91	52.4-59.9	23.0	1.66	19.8-26.3	19.5	1.42	16.7-22.3
Moved within Quintile 4 (N = 8,130)	66.8	2.66	61.6-72.0	34.7	2.39	30.3-39.6	39.6	2.32	35.0-44.1
Moved to higher intensity region (N = 4,484)	69.1	3.28	62.6-75.5	39.0	3.16	32.6-45.0	47.1	3.02	41.0-52.8
Residents of Quintile 5 (highest intensity)									
Did not change HRR of residence (N = 529,464)	54.8	0.27	54.3–55.3	50.4	0.36	49.7–51.1	34.1	0.24	33.6–34.6
Moved to lower intensity regions (N = 16,467)	45.9	1.45	43.0-48.7	19.6	1.46	16.9-22.6	12.8	1.35	10.2-15.4
Moved within Quintile 5 (N = 11,210)	58.7	1.81	55.1-62.2	37.7	2.04	33.9-41.9	33.5	1.68	30.1-36.7

Note: Residents who did not change HRR of residence in each quintile were age 65 or older at the beginning of the study and survived 5 years.

Appendix Table 3. Average Hierarchical Condition Category Scores for Medicare beneficiaries who changed and did not change their place of residence, stratified by the intensity of the Hospital Referral Region prior to and after moving, including those who had 10% or more claims from outside their original region of residence during the two years prior to the move (i.e. snowbirds).

	During first year of study	During last year of study	Percent Increase		
			%	SE	95% CI
Resident of Quintile One (lowest intensity)					
Did not change HRR of residence (N= 600,490)	0.90	1.12	24.3	0.13	24.1-24.6
Moved within Quintile One (N = 10,943)	0.92	1.15	24.5	1.01	22.5-26.5
Moved to higher intensity region (N = 12,310)	0.91	1.22	33.7	1.03	31.7-35.7
Resident of Quintile Two (Second lowest)					
Did not change HRR of residence (N= 583,865)	0.94	1.19	26.5	0.13	26.2-26.7
Moved to lower intensity region (N = 4,699)	0.97	1.21	25.0	1.50	22.0-27.9
Moved within Quintile 2 (N = 3,973)	0.98	1.27	28.6	1.68	25.3-31.9
Moved to higher intensity region (N =10,680)	0.95	1.29	35.2	1.10	33.0-37.3
Residents of Quintile 3 (middle intensity)					
Did not change HRR of residence (N = 593,265)	0.96	1.21	26.4	0.13	26.1-26.6
Moved to lower intensity region (N = 7,141)	0.97	1.21	23.7	1.23	21.3-26.1
Moved within Quintile 3 (N = 4,735)	1.00	1.26	26.2	1.52	23.2-29.1
Moved to higher intensity region (N = 8,086)	0.99	1.30	32.2	1.26	29.7-34.6
Residents of Quintile 4 (Second highest)					
Did not change HRR of residence (N = 624,235)	0.97	1.24	28.0	0.14	27.7-28.3
Moved to lower intensity region (N = 13,938)	0.99	1.25	26.9	0.97	25.0-28.8
Moved within Quintile 4 (N = 8,130)	0.97	1.27	31.0	1.29	28.5-33.6
Moved to higher intensity region (N = 4,484)	1.05	1.41	35.1	1.69	31.7-38.4
Residents of Quintile 5 (highest intensity)					
Did not change HRR of residence (N = 529,464)	1.05	1.35	28.0	0.13	27.7-28.2
Moved to lower intensity regions (N = 16,467)	1.04	1.28	23.0	0.81	21.4-24.6
Moved within Quintile 5 (N = 11,210)	1.12	1.51	34.2	1.11	32.1-36.4

Note: Residents who did not change HRR of residence were age 65 or older at the beginning of the study and survived 5 years.

Appendix Table 4. Baseline characteristics of the study population: Medicare beneficiaries, age 65 and over who remained in fee-for-service practice from 1999 to 2005 and changed or did not change their HRR of residence between 2001 and 2003. (Note: this table is for the same population as is described in the paper. It does **not** include the beneficiaries who had 10% or more claims from outside their original region of residence during the two years prior to the move.)

	Demographics			Evaluative and Diagnostic Practices			Diagnosis Scores	
	Mean Age	% Female	% Black	MD Visits	Lab Tests	Imaging Services	Number of Diagnoses	HCC Score
Resident of Quintile One (lowest intensity)								
Did not change HRR of residence (N= 600,490)	75.5 75.5-75.5	59.4 59.3-59.5	1.5 1.5-1.6	9.7 9.7-9.7	7.3 7.3-7.4	2.9 2.9-2.9	0.51 0.51-0.51	0.95 0.94-0.95
Moved 1 to 1 (N = 7,984)	76.1 76.0-76.3	64.3 63.3-65.4	0.5 0.3-0.6	10.8 10.6-11.1	7.5 7.3-7.7	3.1 3.0-3.2	0.59 0.57-0.61	1.03 1.01-1.05
Moved 1 to 2 (N = 1,451)	75.5 75.2-75.9	62.0 59.5-64.5	1.9 1.2-2.6	10.1 9.5-10.6	7.3 6.8-7.9	2.8 2.6-3.0	0.53 0.49-0.57	0.95 0.91-0.98
Moved 1 to 3 (N = 933)	75.4 75.0-75.8	66.7 63.6-69.7	3.0 1.9-4.1	11.6 10.8-12.4	7.4 6.8-8.0	3.5 3.1-3.8	0.60 0.54-0.66	0.99 0.94-1.04
Moved 1 to 4 (N = 882)	75.0 74.6-75.4	64.5 61.3-67.7	3.3 2.1-4.5	10.5 9.7-11.2	7.5 6.8-8.1	3.1 2.8-3.3	0.53 0.47-0.59	0.95 0.90-1.00
Moved 1 to 5 (N = 545)	76.1 75.5-76.6	64.0 60.0-68.1	5.1 3.3-7.0	11.9 10.9-12.9	7.9 7.1-8.8	3.3 3.0-3.6	0.57 0.50-0.65	1.02 0.95-1.09
Resident of Quintile Two (Second lowest)								
Did not change HRR of residence (N= 583,865)	75.4 75.4-75.4	61.0 60.8-61.1	6.3 6.3-6.4	11.0 10.9-11.0	8.5 8.4-8.5	3.2 3.2-3.2	0.59 0.59-0.59	0.99 0.99-0.99
Moved 2 to 1 (N =1,589)	76.1 75.8-76.4	67.1 64.8-69.4	2.1 1.4-2.9	12.4 11.8-13.1	8.6 8.1-9.2	3.5 3.3-3.7	0.64 0.60-0.69	1.05 1.01-1.09
Moved 2 to 2 (N = 2,302)	76.3 76.0-76.6	67.0 65.1-69.0	4.0 3.2-4.8	12.4 11.8-12.9	8.3 7.8-8.8	3.6 3.4-3.8	0.68 0.65-0.72	1.08 1.04-1.11
Moved 2 to 3 (N = 1,278)	75.7 75.3-76.0	68.1 65.5-70.6	6.7 5.3-8.0	11.7 11.1-12.4	8.5 7.8-9.2	3.4 3.2-3.7	0.60 0.55-0.65	1.00 0.95-1.04
Moved 2 to 4 (N = 1,281)	75.5 75.1-75.8	65.9 63.3-68.5	6.5 5.1-7.8	11.4 10.7-12.1	8.1 7.5-8.7	3.2 2.9-3.4	0.57 0.52-0.62	0.97 0.93-1.01
Moved 2 to 5 (N = 647)	76.3 75.8-76.8	67.7 64.1-71.3	10.0 7.7-12.4	13.0 11.9-14.0	9.5 8.6-10.4	3.6 3.2-4.0	0.66 0.59-0.73	1.09 1.02-1.15
Residents of Quintile 3 (middle intensity)								
Did not change HRR of residence (N = 593,265)	75.3 75.3-75.3	61.5 61.4-61.7	8.0 8.0-8.1	11.5 11.5-11.5	9.0 9.0-9.0	3.4 3.3-3.4	0.61 0.61-0.61	1.00 1.00-1.01
Moved 3 to 1 (N = 986)	76.2 75.8-76.6	67.3 64.4-70.3	2.1 1.2-3.0	12.4 11.5-13.3	8.8 8.1-9.4	3.4 3.1-3.7	0.63 0.58-0.69	1.02 0.97-1.06
Moved 3 to 2 (N = 1,219)	75.8 75.5-76.2	68.3 65.7-70.9	6.5 5.1-7.9	12.7 11.8-13.5	8.8 8.2-9.5	3.5 3.3-3.8	0.65 0.60-0.70	1.06 1.02-1.11
Moved 3 to 3 (N = 2,862)	75.9 75.7-76.1	67.3 65.5-69.0	4.9 4.1-5.7	13.4 12.9-13.9	9.3 8.9-9.7	3.9 3.7-4.0	0.74 0.70-0.77	1.11 1.08-1.14
Moved 3 to 4 (N = 1,685)	75.4 75.1-75.7	65.7 63.4-68.0	5.4 4.3-6.5	11.6 11.0-12.2	8.0 7.5-8.5	3.3 3.1-3.5	0.60 0.56-0.65	0.99 0.96-1.03
Moved 3 to 5 (N = 763)	76.0 75.6-76.5	68.7 65.4-72.0	12.1 9.7-14.4	12.4 11.5-13.2	9.0 8.1-9.9	3.3 3.0-3.6	0.64 0.57-0.70	1.04 0.98-1.09

Residents of Quintile 4 (Second highest)

Did not change HRR of residence (N = 624,235)	75.3 75.3-75.4	61.0 60.9-61.1	8.3 8.3-8.4	12.3 12.2-12.3	9.7 9.7-9.8	3.6 3.5-3.6	0.65 0.64-0.65	1.02 1.02-1.02
Moved 4 to 1 (N = 1,134)	76.2 75.9-76.6	66.5 63.7-69.2	2.7 1.8-3.7	13.7 12.8-14.6	10.6 9.9-11.4	3.8 3.5-4.1	0.66 0.60-0.71	1.07 1.02-1.12
Moved 4 to 2 (N = 1,491)	76.1 75.7-76.4	66.2 63.8-68.6	5.3 4.2-6.4	12.7 12.0-13.3	9.9 9.3-10.5	3.5 3.3-3.7	0.67 0.62-0.71	1.05 1.01-1.09
Moved 4 to 3 (N = 1,884)	76.1 75.9-76.4	65.6 63.5-67.8	6.0 4.9-7.1	13.7 13.0-14.3	10.1 9.6-10.6	4.0 3.8-4.2	0.71 0.67-0.76	1.10 1.06-1.13
Moved 4 to 4 (N = 5,188)	75.6 75.4-75.8	64.1 62.8-65.4	4.3 3.8-4.9	13.8 13.4-14.2	10.2 9.9-10.5	4.0 3.9-4.2	0.72 0.69-0.75	1.09 1.07-1.11
Moved 4 to 5 (N = 1,211)	76.7 76.4-77.1	67.1 64.5-69.8	7.9 6.4-9.5	15.0 14.1-16.0	10.8 10.1-11.6	4.2 3.9-4.6	0.74 0.68-0.79	1.16 1.11-1.22

Residents of Quintile 5 (highest intensity)

Did not change HRR of residence (N = 529,464)	75.9 75.9-75.9	62.0 61.8-62.1	9.3 9.2-9.3	14.8 14.8-14.9	12.7 12.6-12.7	3.8 3.8-3.8	0.76 0.76-0.77	1.11 1.11-1.11
Moved 5 to 1 (N = 1,068)	76.9 76.5-77.3	67.8 65.0-70.6	3.5 2.4-4.6	15.8 14.8-16.9	11.9 11.1-12.8	4.0 3.7-4.3	0.82 0.76-0.88	1.19 1.14-1.25
Moved 5 to 2 (N = 1,047)	76.7 76.3-77.0	66.2 63.3-69.1	10.3 8.5-12.2	15.3 14.3-16.3	12.4 11.6-13.3	4.0 3.7-4.4	0.83 0.76-0.89	1.20 1.15-1.26
Moved 5 to 3 (N = 1,355)	76.5 76.1-76.8	66.6 64.1-69.1	12.5 10.7-14.2	15.5 14.6-16.4	12.2 11.4-12.9	3.9 3.6-4.2	0.77 0.72-0.82	1.17 1.15-1.22
Moved 5 to 4 (N = 2,015)	76.3 76.0-76.6	64.5 62.4-66.6	8.6 7.4-9.9	14.9 14.2-15.6	11.8 11.2-12.4	4.1 3.8-4.3	0.76 0.72-0.81	1.10 1.06-1.14
Moved 5 to 5 (N = 9,114)	76.7 76.5-76.8	66.1 65.1-67.1	7.1 6.6-7.6	18.3 17.9-18.7	14.7 14.4-15.1	4.6 4.5-4.7	0.96 0.93-0.98	1.28 1.26-1.30

Note: in each cell, upper number is the average or percentage of a measure and lower range is its 95% Confidence Interval. The data for movers are from the year before move and the data for non-movers are from 2002, corresponding to the year before the move for movers.

Appendix Table 5. Percent increase in number of major diagnoses, laboratory tests and imaging services among Medicare beneficiaries who changed and did not change their place of residence, stratified by the intensity of the Hospital Referral Region prior to and after moving. (Note: this table is for the same population as is described in the paper. It does **not** include the beneficiaries who had 10% or more claims from outside their original region of residence during the two years prior to the move.). These data are analogous to the data presented in Table 2 of the paper and reveal a similar pattern to that observed when stratification was simply “up” or “down”. The more finely grained stratification reveals a highly consistent dose-response relationship between the intensity of the region to which beneficiaries moved and their increase in diagnoses and diagnostic testing.

Population*	Change in diagnoses per person			Change in imaging services per person			Change in laboratory tests per person		
	%	SE	95% CI	%	SE	95% CI	%	SE	95% CI
Resident of Quintile 1(lowest intensity)									
Did not change HRR (N= 600,490)	65.6	0.35	64.9–66.3	43.9	0.34	43.2–44.5	31.6	0.26	31.1–32.1
Moved 1 to 1 (N = 7,984)	61.7	2.98	55.7–67.4	24.1	2.54	19.1–29.0	23.7	2.35	19.1–28.2
Moved 1 to 2 (N = 1,451)	82.7	7.77	66.6–97.0	49.7	6.71	36.5–62.8	47.0	7.19	32.9–61.1
Moved 1 to 3 (N = 933)	98.6	10.70	77.4–119.3	67.6	9.39	49.2–86.0	74.2	8.84	56.8–91.5
Moved 1 to 4 (N = 882)	114.7	12.30	90.5–138.7	75.8	9.67	56.9–94.8	91.6	11.2	69.6–113.6
Moved 1 to 5 (N = 545)	136.5	19.06	98.1–172.9	88.5	14.74	60.0–117.8	119.8	14.2	91.7–147.3
Resident of Quintile 2									
Did not change HRR (N= 583,865)	63.9	0.31	63.3–64.5	49.6	0.34	48.9–50.3	37.4	0.25	36.9–37.9
Moved 2 to 1 (N = 1,589)	52.7	6.22	40.5–64.9	26.4	5.39	15.9–37.0	6.0	4.56	-2.9–14.9
Moved 2 to 2 (N = 2,302)	62.6	4.92	53.4–72.6	26.6	4.44	17.8–35.3	36.4	4.74	27.1–45.7
Moved 2 to 3 (N = 1,278)	85.9	8.01	69.8–101.2	41.5	6.14	29.5–53.5	47.9	6.41	35.3–60.5
Moved 2 to 4 (N = 1,281)	87.2	8.79	69.8–104.3	54.0	6.98	40.3–67.7	70.3	7.41	55.8–84.8
Moved 2 to 5 (N = 647)	111.5	12.88	85.5–136.0	56.8	9.79	37.6–76.0	58.7	10.53	38.1–79.3
Residents of Quintile 3									
Did not change HRR (N = 593,265)	62.6	0.29	62.0–63.2	47.8	0.34	47.1–48.5	36.0	0.23	35.5–36.4
Moved 3 to 1 (N = 986)	54.4	8.40	38.0–70.9	31.8	7.45	17.2–46.4	13.1	5.68	2.0–24.2
Moved 3 to 2 (N = 1,219)	75.1	7.98	58.4–89.6	38.0	7.28	23.7–52.2	49.7	4.47	37.0–62.3
Moved 3 to 3 (N = 2,862)	60.0	4.65	50.4–68.7	28.7	4.01	20.9–36.6	36.7	3.78	29.3–44.1
Moved 3 to 4 (N = 1,685)	74.6	6.84	61.0–87.9	53.4	5.90	41.8–64.9	62.9	6.60	50.0–75.9
Moved 3 to 5 (N = 763)	106.6	11.44	84.1–128.9	79.9	12.18	56.0–103.8	104.9	10.25	84.9–125.0
Residents of Quintile 4 (Second highest)									
Did not change HRR (N = 624,235)	62.5	0.30	61.9–63.1	49.7	0.33	49.1–50.3	37.6	0.24	37.1–38.0
Moved 4 to 1 (N = 1,134)	45.5	6.67	31.8–58.0	11.1	5.14	1.0–21.2	1.7	4.84	-7.7–11.2
Moved 4 to 2 (N = 1,491)	65.0	6.58	51.7–77.5	25.0	5.43	14.4–35.6	23.8	5.15	13.7–33.9
Moved 4 to 3 (N = 1,884)	69.7	6.14	57.9–82.0	35.2	5.24	24.9–45.5	17.3	4.13	9.2–25.4
Moved 4 to 4 (N = 5,188)	68.4	3.06	62.4–74.4	33.1	3.03	27.2–39.1	40.2	2.80	34.7–45.6
Moved 4 to 5 (N = 1,211)	84.7	7.31	70.0–98.6	50.2	6.94	36.6–63.8	48.8	6.00	37.0–60.5
Residents of Quintile 5 (highest intensity)									
Did not change HRR (N = 529,464)	54.8	0.27	54.3–55.3	50.4	0.36	49.7–51.1	34.1	0.24	33.6–34.6
Moved 5 to 1 (N = 1,068)	31.8	6.28	19.2–43.8	1.0	5.72	-10.2–12.2	-5.2	5.30	-15.6–5.2
Moved 5 to 2 (N = 1,047)	39.4	5.85	28.2–51.2	8.5	6.24	-3.7–20.8	1.3	5.19	-8.9–11.5
Moved 5 to 3 (N = 1,355)	43.1	5.76	31.3–53.9	27.4	5.96	15.7–39.1	9.5	4.24	1.2–17.8
Moved 5 to 4 (N = 2,015)	50.5	5.25	40.1–60.6	22.1	4.75	12.7–31.4	13.6	3.62	6.5–20.7
Moved 5 to 5 (N = 9,114)	58.5	2.06	54.4–62.5	38.6	2.42	33.9–43.4	32.8	1.84	29.2–36.4

Note: Residents who did not change HRR of residence in each quintile were age 65 or older at the beginning of the study and survived 5 years.

Appendix Table 6. Average Hierarchical Condition Category Scores for Medicare beneficiaries who changed and did not change their place of residence, stratified by the intensity of the Hospital Referral Region prior to and after moving, (Note: this table is for the same population as is described in the paper that is shown in Figure 2. It does not include the beneficiaries who had 10% or more claims from outside their original region of residence during the two years prior to the move.)

Note: To derive the average impact on risk scores of moving to Quintile 1 compared to moving to Quintile 5, we determined the ratio of HCC scores during the last year of the study for each stratum: (e.g. for Quintile 3 residents the ratio is: 1.21 (1.38 / 1.14). We then averaged these five ratios to get the estimate reported in the text (average scores 19% higher among those moving to Quintile 5 than to Quintile 1).

	HCC Score				
	During first year of study	During last year of study	Increase During Study Period		
			%	SE	95% CI
Resident of Quintile One (lowest intensity)					
Did not change HRR of residence (N= 600,490)	0.90	1.12	24.3	0.13	24.1-24.6
Moved 1 to 1 (N = 7,984)	0.93	1.16	25.3	1.22	22.9–27.7
Moved 1 to 2 (N = 1,451)	0.87	1.12	29.6	2.82	24.1–35.2
Moved 1 to 3 (N = 933)	0.87	1.21	38.6	3.87	31.0–46.2
Moved 1 to 4 (N = 882)	0.85	1.23	44.7	3.98	36.9–52.5
Moved 1 to 5 (N = 545)	0.88	1.32	50.0	6.04	38.2–61.8
Resident of Quintile Two (Second lowest)					
Did not change HRR of residence (N= 583,865)	0.94	1.19	26.5	0.13	26.2-26.7
Moved 2 to 1 (N =1,589)	0.94	1.15	22.3	2.42	17.5–27.1
Moved 2 to 2 (N = 2,302)	0.98	1.23	25.2	2.20	20.9–29.5
Moved 2 to 3 (N = 1,278)	0.87	1.16	33.4	3.14	27.2–39.5
Moved 2 to 4 (N = 1,281)	0.88	1.21	37.9	3.22	31.6–44.3
Moved 2 to 5 (N = 647)	0.96	1.38	43.8	4.58	34.8–52.7
Residents of Quintile 3 (middle intensity)					
Did not change HRR of residence (N = 593,265)	0.96	1.21	26.4	0.13	26.1-26.6
Moved 3 to 1 (N = 986)	0.91	1.14	25.0	3.40	18.4–31.7
Moved 3 to 2 (N = 1,219)	0.93	1.19	28.4	3.23	22.0–34.7
Moved 3 to 3 (N = 2,862)	1.00	1.25	25.1	2.08	21.0–29.2
Moved 3 to 4 (N = 1,685)	0.90	1.22	34.8	2.75	29.4–40.2
Moved 3 to 5 (N = 763)	0.92	1.38	50.2	4.94	40.5–59.8
Residents of Quintile 4 (Second highest)					
Did not change HRR of residence (N = 624,235)	0.97	1.24	28.0	0.14	27.7-28.3
Moved 4 to 1 (N = 1,134)	0.96	1.18	23.4	3.12	17.3–29.5
Moved 4 to 2 (N = 1,491)	0.93	1.22	31.2	2.82	25.7–36.7
Moved 4 to 3 (N = 1,884)	0.96	1.29	35.4	2.95	29.6–41.2
Moved 4 to 4 (N = 5,188)	0.97	1.26	30.5	1.58	27.4–33.6
Moved 4 to 5 (N = 1,211)	1.00	1.37	37.3	3.16	31.1–43.5
Residents of Quintile 5 (highest intensity)					
Did not change HRR of residence (N = 529,464)	1.05	1.35	28.0	0.13	27.7-28.2
Moved 5 to 1 (N = 1,068)	1.02	1.20	17.8	3.03	11.9–23.8
Moved 5 to 2 (N = 1,047)	1.04	1.25	19.9	3.13	13.8–26.0
Moved 5 to 3 (N = 1,355)	1.02	1.24	21.7	3.07	15.6–27.7
Moved 5 to 4 (N = 2,015)	1.02	1.25	22.8	2.42	18.0–27.5
Moved 5 to 5 (N = 9,114)	1.13	1.51	34.1	1.26	31.6–36.6

Appendix Table 7. The Nine Chronic Diseases and Associated Diagnosis Codes in International Classification of Diseases, Version 9, Clinical Modification (ICD-9-CM)

Disease	ICD-9-CM Diagnosis Codes
1. Malignant Tumor or Leukemia	1500, 1501, 1502, 1503, 1504, 1505, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1518, 1519, 1550, 1551, 1552, 1570, 1571, 1572, 1573, 1574, 1578, 1579, 1580, 1588, 1589, 1620, 1622, 1623, 1624, 1625, 1628, 1629, 1630, 1631, 1638, 1639, 1830, 1832, 1833, 1834, 1835, 1838, 1839, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, (Malignant Neoplasm) 1960, 1961, 1962, 1963, 1965, 1966, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 19881, 19882, 19889, 1990, 1991, (Secondary Malignant Neoplasm) 20400, 20410, 20420, 20480, 20490, 20500, 20510, 20520, 20530, 20580, 20590, 20600, 20610, 20620, 20680, 20690, 20700, 20710, 20720, 20780, 20800, 20810, 20820, 20880, 20890 (Leukemia)
2. Chronic Pulmonary Disease	4911, 49120, 49121, 49122, 4918, 4919, 4920, 4928, 49310, 49311, 49312, 49320, 49321, 49322, 49390, 49391, 49392, 494 , 4940, 4941, 496 , 501 , 5064, 515
3. Coronary Artery Disease	4111, 4118, 41181, 41189, 412 , 4130, 4139, 4140, 41400, 41401, 41402, 41403, 41404, 41405, 41406, 41407, 4148, 4149
4. Congestive Heart Failure	4280, 4281, 4282, 42820, 42821, 42822, 42823, 4283, 42830, 42831, 42832, 42833, 4284, 42840, 42841, 42842, 42843, 4289, 40201, 40211, 40291, 39891, 40401, 40403, 40411, 40413, 40491, 40493
5. Peripheral Vascular Disease	4400, 4401, 44020, 44021, 44022, 44023, 44024, 44029, 4403, 44030, 44031, 44032, 4408, 4409, 4410, 44100, 44101, 44102, 44103, 4411, 4412, 4413, 4414, 4415, 4416, 4417, 4419, 4439
6. Severe Chronic Liver Disease	5712, 5715, 5716, 5723
7. Diabetes Mellitus with End Organ Damage	25040, 25041, 25042, 25043, 25050, 25051, 25052, 25053, 25060, 25061, 25062, 25063, 25070, 25071, 25072, 25073, 25090, 25091, 25092, 25093, 3572, 36641, 36201, 36202
8. Chronic Renal Failure	40301, 40311, 40391, 585 , 5851, 5852, 5853, 5854, 5855, 5856, 5859, V451, V560, V568
9. Dementia	2900, 29010, 29011, 29012, 29013, 29020, 29021, 2903, 29040, 29041, 29042, 29043, 2908, 2909, 2940, 2941, 29410, 29411, 2948, 2949, 3310, 3312, 797

Appendix Table 8. Changes in prevalence of reported chronic conditions during the five years before and after a move stratified by whether the move was **within** one of the nine U.S. Census regions or **across** these Census regions.

Population	Change in diagnoses per person for those moving within one of nine US geographic regions (N=29,753)				Change in diagnoses services per person for those moving between nine US geographic regions (N = 22,161)			
	N	%	SE	95% CI	N	%	SE	95% CI
Resident of Quintile One (lowest intensity)								
Moved 1 to 1	6,112	64.0	3.68	56.7–71.2	1,872	53.5	6.53	40.8–66.3
Moved 1 to 2	792	75.9	10.57	55.1–96.6	659	90.2	13.38	64.0–116.4
Moved 1 to 3	348	109.8	18.2	74.0–145.5	585	91.1	14.21	63.3–119.0
Moved 1 to 4	214	103.3	25.28	53.7–152.8	668	118.2	14.93	88.9–147.4
Moved 1 to 5	199	134.0	29.92	77.3–194.6	346	135.2	24.09	88.0–182.4
Resident of Quintile Two (Second lowest)								
Moved 2 to 1	803	51.6	8.26	35.4–67.8	786	53.8	8.82	36.6–71.1
Moved 2 to 2	1,466	67.6	6.56	54.7–80.4	836	54.2	7.81	39.1–69.7
Moved 2 to 3	630	96.8	13.54	70.3–123.4	648	75.5	11.05	53.9–97.2
Moved 2 to 4	517	103.8	16.06	72.4–135.3	764	76.3	10.03	56.6–96.0
Moved 2 to 5	292	111.1	19.51	72.9–149.4	355	110.5	19.62	72.0–148.9
Residents of Quintile 3 (middle intensity)								
Moved 3 to 1	376	41.3	12.78	16.2–66.3	610	62.5	11.03	40.9–84.2
Moved 3 to 2	626	71.9	10.69	51.0–92.9	593	76.1	11.82	52.9–99.3
Moved 3 to 3	1,862	59.4	5.17	49.3–69.5	1,000	59.8	7.75	44.6–75.0
Moved 3 to 4	857	83.2	9.81	64.0–102.4	828	66.6	8.82	49.3–83.9
Moved 3 to 5	267	70.1	15.71	39.3–100.9	496	130.0	16.14	98.4–161.7
Residents of Quintile 4 (Second highest)								
Moved 4 to 1	255	38.1	12.51	13.5–62.6	879	46.7	7.49	32.0–61.4
Moved 4 to 2	636	66.6	10.12	46.74–86.4	855	63.1	8.38	46.7–79.6
Moved 4 to 3	930	73.7	8.78	56.5–90.9	954	66.4	8.17	50.4–82.4
Moved 4 to 4	3,382	70.0	4.17	61.9–78.2	1,806	65.4	5.91	53.8–76.9
Moved 4 to 5	534	70.7	11.69	47.8–93.6	677	95.9	10.98	74.3–117.4
Residents of Quintile 5 (highest intensity)								
Moved 5 to 1	392	43.7	10.94	22.2–65.1	676	24.9	6.64	11.9–38.0
Moved 5 to 2	402	53.2	11.52	30.6–75.8	645	32.2	6.80	18.9–45.6
Moved 5 to 3	428	49.1	10.45	28.6–69.6	927	39.5	7.26	25.3–53.7
Moved 5 to 4	857	75.6	8.60	58.7–92.4	1,158	34.1	5.51	23.3–44.9
Moved 5 to 5	6,576	61.8	2.32	57.3–66.3	2,538	48.8	3.77	41.4–56.2

Appendix Table 9. Changes in rate of imaging studies per person during the five years before and after a move stratified by whether the move was **within** one of the nine U.S. Census regions or **across** of these Census regions.

Population	Change in imaging studies per person for those moving within one of nine US geographic regions (N=29,753)				Change in imaging studies per person for those moving between nine US geographic regions (N = 22,161)			
	N	%	SE	95% CI	N	%	SE	95% CI
Resident of Quintile One (lowest intensity)								
Moved 1 to 1	6,112	24.9	2.75	19.5–30.2	1,872	21.6	5.29	11.2–31.9
Moved 1 to 2	792	41.6	8.63	24.7–58.6	659	59.5	10.5	39.0–80.0
Moved 1 to 3	348	77.7	15.30	47.7–107.7	585	61.8	11.81	38.6–84.9
Moved 1 to 4	214	63.2	21.85	20.3–106.0	668	80.1	11.19	58.2–102.1
Moved 1 to 5	199	93.3	27.9	38.6–147.9	346	86.3	18.40	50.3–122.4
Resident of Quintile Two (Second lowest)								
Moved 2 to 1	803	31.7	8.13	15.8–47.6	786	21.7	7.09	7.8–35.6
Moved 2 to 2	1,466	27.5	5.26	17.2–37.8	836	24.9	8.20	8.8–41.0
Moved 2 to 3	630	38.1	8.53	21.4–54.8	648	44.9	8.82	27.6–62.2
Moved 2 to 4	517	57.8	12.0	34.2–81.3	764	51.4	8.23	35.3–67.5
Moved 2 to 5	292	41.1	13.0	15.7–66.5	355	70.4	14.62	41.7–99.1
Residents of Quintile 3 (middle intensity)								
Moved 3 to 1	376	28.7	11.17	6.8–50.5	610	33.8	9.21	15.7–51.8
Moved 3 to 2	626	48.2	9.96	28.7–67.7	593	28.4	10.09	8.6–48.2
Moved 3 to 3	1,862	30.6	4.78	21.2–40.0	1,000	25.3	6.73	12.1–38.5
Moved 3 to 4	857	54.2	8.35	37.8–70.6	828	52.6	8.26	36.4–68.8
Moved 3 to 5	267	104.7	22.5	60.6–148.8	496	68.6	14.03	41.1–96.1
Residents of Quintile 4 (Second highest)								
Moved 4 to 1	255	27.2	13.25	1.3–53.2	879	7.1	5.75	-4.2–18.3
Moved 4 to 2	636	19.4	8.00	3.7–35.1	855	29.4	7.40	14.9–43.9
Moved 4 to 3	930	32.7	7.44	18.2–47.3	954	37.7	5.91	26.1–49.3
Moved 4 to 4	3,382	31.8	3.74	24.5–39.1	1,806	35.8	5.35	25.3–46.3
Moved 4 to 5	534	49.1	9.93	29.6–68.6	677	51.0	10.2	31.1–71.0
Residents of Quintile 5 (highest intensity)								
Moved 5 to 1	392	20.5	11.19	-1.5–42.4	676	-8.0	5.53	-18.8–2.82
Moved 5 to 2	402	11.8	8.74	-5.3–28.9	645	6.6	8.24	-9.6–22.7
Moved 5 to 3	428	29.9	10.2	9.9–49.9	927	26.3	7.22	12.1–40.4
Moved 5 to 4	857	27.9	6.62	15.0–40.9	1,158	17.4	6.30	5.0–29.7
Moved 5 to 5	6,576	39.1	2.76	33.7–44.5	2,538	37.4	3.98	29.6–45.2

Appendix Table 10. Changes in laboratory tests per person per year during the five years before and after a move stratified by whether the move was **within** one of the nine U.S. Census regions or **across** of these Census regions.

Population	Change in laboratory tests per person for those moving within one of nine US geographic regions (N=29,753)				Change in laboratory tests per person for those moving between nine US geographic regions (N = 22,161)			
	N	%	SE	95% CI	N	%	SE	95% CI
Resident of Quintile One (lowest intensity)								
Moved 1 to 1	6,112	24.4	2.68	19.2–29.7	1,872	21.1	4.61	12.1–30.2
Moved 1 to 2	792	36.6	9.12	18.7–54.5	659	61.5	11.80	38.4–84.7
Moved 1 to 3	348	75.5	15.7	44.6–106.3	585	73.4	10.89	52.1–94.8
Moved 1 to 4	214	84.8	27.9	30.1–139.6	668	93.7	12.4	69.4–117.9
Moved 1 to 5	199	99.6	21.1	58.4–140.9	346	131.4	20.07	92.1–170.8
Resident of Quintile Two (Second lowest)								
Moved 2 to 1	803	9.6	7.44	-5.0–24.1	786	2.6	6.09	-9.3–14.6
Moved 2 to 2	1,466	38.9	5.53	28.0–49.7	836	32.5	8.50	15.8–49.2
Moved 2 to 3	630	53.8	9.20	35.8–71.8	648	42.2	8.65	25.3–59.2
Moved 2 to 4	517	76.9	12.00	53.4–100.4	764	65.9	10.23	45.8–85.9
Moved 2 to 5	292	51.2	14.80	22.2–80.2	355	65.0	13.3	38.9–91.1
Residents of Quintile 3 (middle intensity)								
Moved 3 to 1	376	10.1	9.18	-7.8–28.1	610	14.6	7.93	-0.9–30.2
Moved 3 to 2	626	48.5	10.1	28.6–68.3	593	50.9	9.26	32.8–69.1
Moved 3 to 3	1,862	36.0	4.67	26.8–45.2	1,000	38.0	6.33	25.6–50.5
Moved 3 to 4	857	58.3	8.20	42.2–74.4	828	67.8	10.37	47.5–88.2
Moved 3 to 5	267	114.8	17.27	81.0–148.7	496	99.6	14.1	71.9–127.2
Residents of Quintile 4 (Second highest)								
Moved 4 to 1	255	1.6	9.69	-17.4–20.6	879	1.8	5.33	-8.7–12.2
Moved 4 to 2	636	26.7	7.30	12.4–41.0	855	21.7	6.85	8.3–35.1
Moved 4 to 3	930	16.0	5.94	4.3–27.6	954	18.7	5.23	8.4–28.9
Moved 4 to 4	3,382	41.2	3.39	34.6–47.9	1,806	38.0	4.99	28.3–47.8
Moved 4 to 5	534	43.9	8.49	27.3–60.6	677	52.7	8.95	35.1–70.2
Residents of Quintile 5 (highest intensity)								
Moved 5 to 1	392	2.1	11.70	-20.8–25.0	676	-8.9	5.60	-19.8–2.1
Moved 5 to 2	402	0.3	8.10	-15.6–16.2	645	1.9	5.82	-9.5–13.3
Moved 5 to 3	428	13.8	8.06	-2.0–29.6	927	7.7	4.82	-1.8–19.1
Moved 5 to 4	857	18.3	5.32	7.9–28.7	1158	10.2	5.17	0.1–20.4
Moved 5 to 5	6,576	34.9	2.19	30.6–39.2	2,538	28.5	2.74	23.1–33.9

Appendix Table 11. Relative risk of death within one (Table 11a) and three years (Table 11b) of move, stratified by whether the beneficiary moved up or down in intensity. Comparison group is those who moved within a quintile.

Appendix Table 11a: One Year Relative Risk of death, stratified by whether the beneficiary moved up or down in intensity.

	Relative Risk	p-value	95% CI
Age	1.18	< 0.01	1.13-1.23
Age-squared	1.00	< 0.01	1.00-1.00
Male (contrast with female)	1.40	< 0.01	1.35-1.45
Other races (contrast with black)	0.69	< 0.01	0.65-0.74
Movers			
Down	0.94	< 0.01	0.90-0.98
Within a quintile	1.00		
Up	0.94	< 0.01	0.90-0.98

Appendix Table 11b: Three Year Relative Risk of death, stratified by whether the beneficiary moved up or down in intensity.

	Relative Risk	p-value	95% CI
Age	1.22	< 0.01	1.20-1.24
Age squared	1.00	< 0.01	1.00-1.00
Male (contrast with female)	1.37	< 0.01	1.35-1.40
Other races (contrast with black)	0.80	< 0.01	0.77-0.83
Movers			
Down	0.95	< .01	0.93-0.97
Within a quintile	1.00		
Up	0.98	0.07	0.96-1.00

Appendix Table 12. Increase in the prevalence of specific chronic conditions among movers and non-movers.

	Movers (N = 51,914)				National Non-movers (N = 2,931,319)			
	% with Diagnoses		Increase		% with Diagnoses		Increase	
	During first year of study	During last year of study	%	95% CI	During first year of study	During last year of study	%	95% CI
Malignant cancer/leukemia	1.2	2.2	88.6	73.4-103.8	1.4	3.3	138.1	135.8-140.3
Chronic pulmonary disease	11.9	16.4	38.4	35.1-41.8	11.7	16.0	36.8	36.4-37.2
Coronary artery disease	20.9	24.0	15.0	13.0-17.1	20.2	25.1	24.3	24.0-24.6
Congestive heart failure	8.2	14.5	77.6	72.2-83.0	7.3	13.5	84.1	83.4-84.8
Peripheral vascular disease	8.4	16.3	92.9	86.6-99.2	7.9	13.3	69.2	68.6-69.9
Several chronic liver disease	0.1	0.2	74.0	29.6-118.3	0.2	0.3	83.4	78.5-88.4
Diabetes with end-organ damage	2.2	2.7	21.3	13.6-29.0	2.3	2.8	18.0	17.1-18.9
Chronic renal failure	1.1	4.5	308.3	276.4-340.3	1.5	6.2	327.1	323.1-331.1
Dementia	4.6	15.4	233.2	220.0-246.4	3.3	9.6	189.7	188.0-191.4